System Upgrades, Modifications, Cats and Dogs

May 2000

System Upgrades, Modifications, Cats and Dogs

PESYSTEMS, INC.

Or….

How to put radial tires on a buckboard wagon

The Need for Upgrades/Mods

- **Average Age of AFRC aircraft is over 22 years**
  - **A-10 = 18 years**
  - **B-52 = 37 years**
  - **C-5 = 27 years**
  - **C-130 = 19 years**
  - **KC-135 = 38 years**
  - **C-141 = 32 years**
  - **F-16 = 11 years**
  - **H-60 = 8 years**
- **Upgrades are a way of life, given the realities of the Defense budget and the threat**

Mods/Upgrades Outline

- **Acquisition Reform**
  - Lightning Bolts ‘99
- **Systems engineering and integration**
  - No such thing as COTS if it has to plug in
- **Test**
  - What does the contract say?
- **Program Reviews - Insight vs oversight**
  - Metrics and Technical Performance Measurements

Value Engineering

CANDI

Earned Value

DAWIA

ACQUISITION REFORM

The "KISS" principle

Single Process Initiative

CAIV

Open Systems

Commercial Specs

IPPD

IPT's

ACQUISITION REFORM
(SEVEN MAJOR FOCUS AREAS)

- Supporting the War Fighter
- Improving Acquisition Business Process
- Reducing Weapon System Life Cycle Costs
- Incentivizing Program Stability
- Implementing Statutory and Regulatory Reforms
- Conducting Pilot Demonstrations
- Managing the Acquisition Workforce

What it is and is not

PEC SYSTEMS, INC.

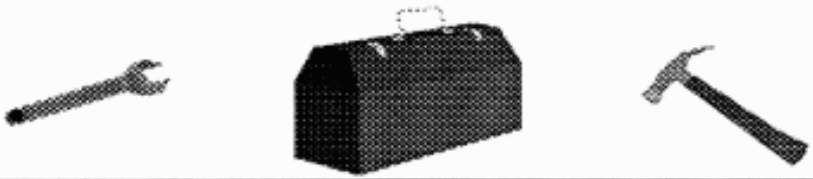
ACQUISITION REFORM

What it is:

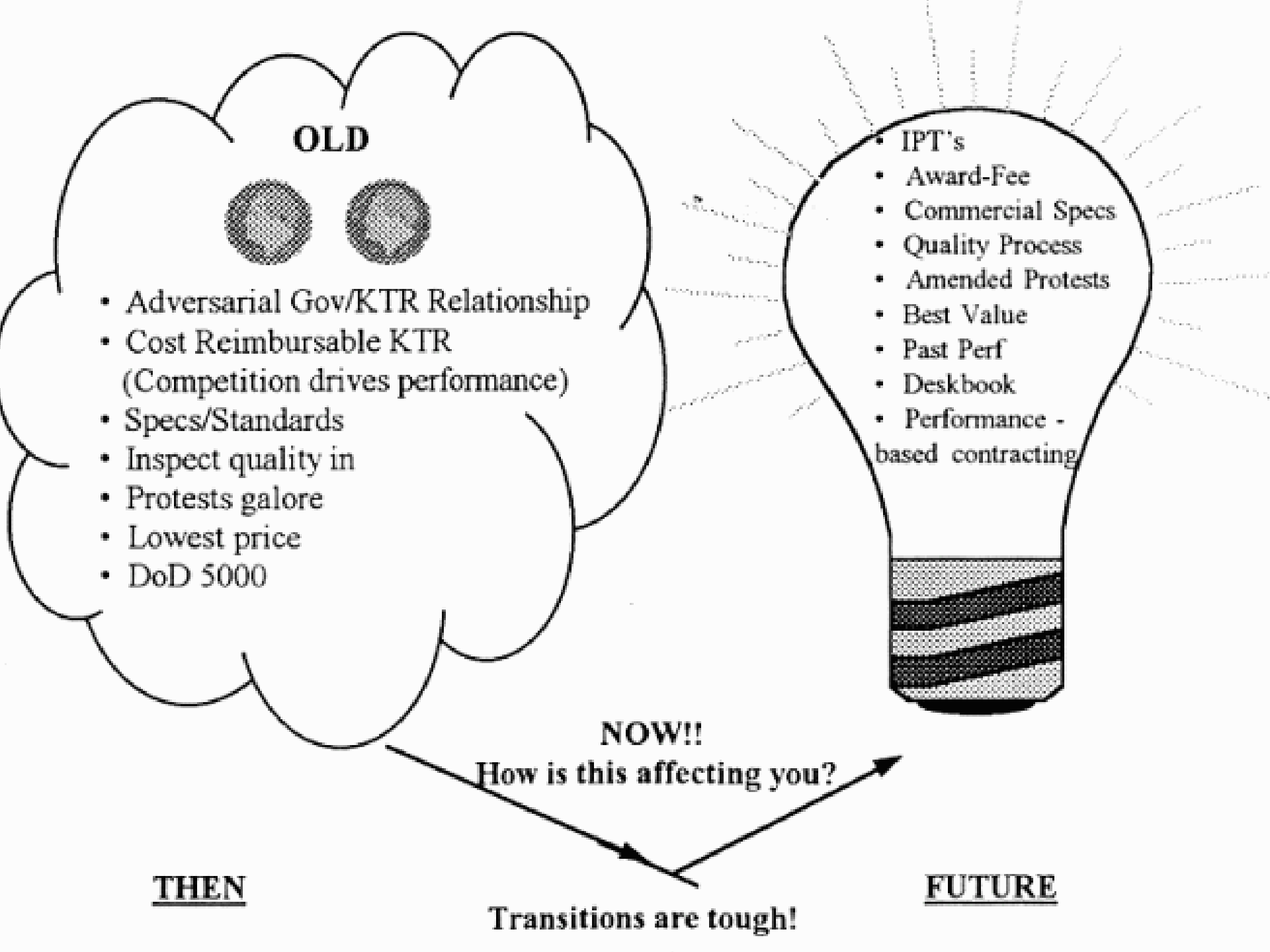
A new philosophy of System Acquisition; based on common sense, empowering smart, well trained people to do their best to support our warfighters.

What it is not:

It is not designed to "Give away the farm" to contractors.
It is a toolbox, not a cookbook.



Smart, well trained, empowered people are the key!!!!


OLD
• Adversarial Gov/KTR Relationship
• Cost Reimbursable KTR
(Competition drives performance)
• Specs/Standards
• Inspect quality in
• Protests galore
• Lowest price
• DoD 5000
• IPT's
• Award-Fee
• Commercial Specs
• Quality Process
• Amended Protests
• Best Value
• Past Perf
• Deskbook
• Performance - based contracting
NOW!!
How is this affecting you?
THEN
FUTURE
Transitions are tough!

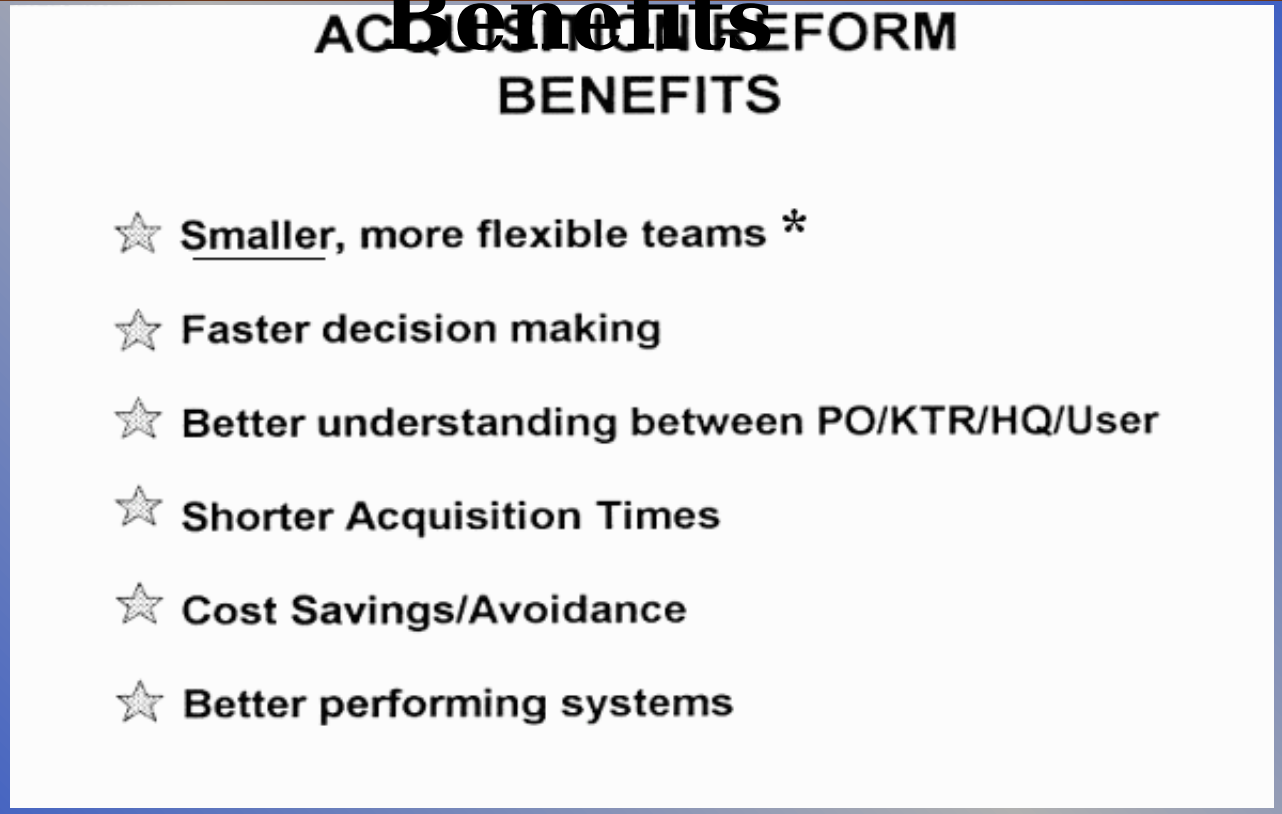
ACQUISITION REFORM - TOOLS

OLD TOOL	NEW TOOL	EFFECT
"Oversight"	"Insight"	Government insight and reporting not oversight and micro management
DoD 5000	Deskbook	Cookbook (old DoD 5000) gone, tools (discretionary) found in Deskbook
	ACTD's	Allow promising technology to mature in an operational environment
Detailed Requirements	Performance Based Contracting	Motivate contractor to perform to Mgt. expectations laid out by Gov't
Specs/Standards	Commercial Specs	Industry Self-regulation
Quality Inspection	Quality Process (ISO 9000)	Process yields better quality
Program Reviews	IPT's	Integrates Gov't/Contractor into a seamless team, all working towards same goal

ACQUISITION REFORM - TOOLS

OLD TOOL	NEW TOOL	EFFECT
Hiring	DAWIA	Train and educate the entire acquisition workforce
Different Service Standards	Single Process Initiative	Allows wholesale change to new philosophy across many contracts
Closed Architecture	Open Systems	Design systems for growth opportunities
Cost dependent on function of requirements	CAIV	Scope total price for an acquisition upfront and early
CA NDI (Exception)	CA NDI	Commercial and Non Developmental Item Acquisitions
C/S	Earned Value	Contractor and Government insight
ECPs	Value Engineering	Lets contractor share in "profit" for well engineered system
	OTHERS??	

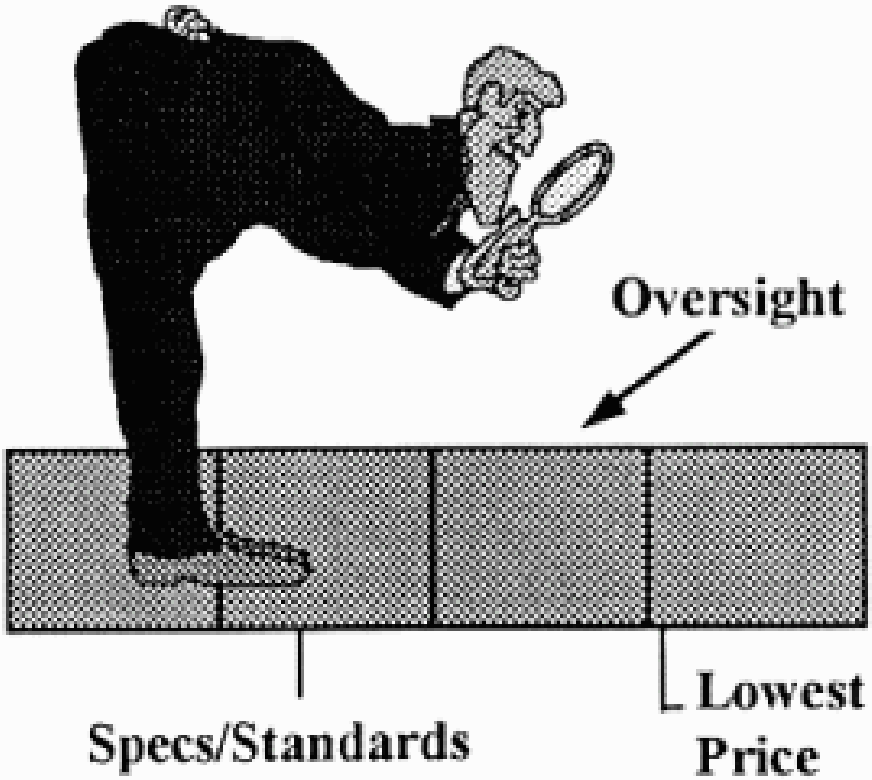
Acquisition Reform Benefits



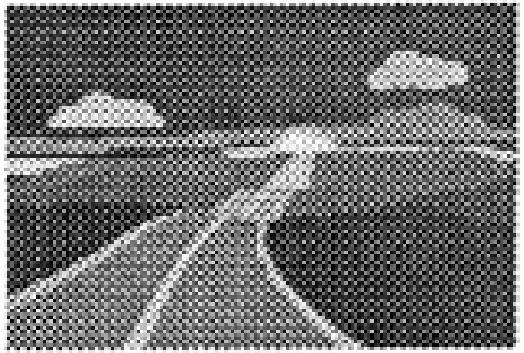
* *All that has been accomplished to date.*

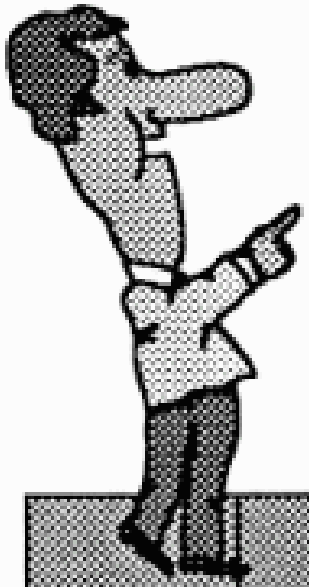
What Acquisition Reform Means To You

"Old"

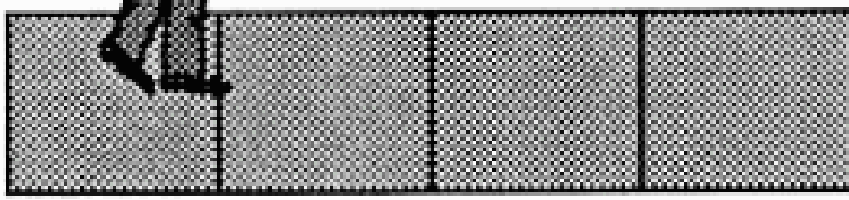


"New"





- Limited Protest
- Performance Based
- Past Performance
- Best Value



Lightning Bolts ‘99

Outline

- Background
- Acquisition Support Teams (ASTs)
- Superior Source Selections
- Market Analysis and Pricing Centers of Expertise
- Alternative Dispute Resolution (ADR)
- Contracting Support to the Aerospace Expeditionary Forces
- Improved Payment Processes
- Product Support Partnerships
- Conclusion

Air Force Acquisition Reform Lightning Strikes Again

- **Lightning Bolts ‘99**
  - Mrs.. Darleen A. Druyun, Principal Deputy Assistant Secretary (Acquisition and Management), announced seven new Lightning Bolts on 23 April ‘99
  - Designed to achieve greater efficiencies and costs savings in acquisition and sustainment of weapon systems
  - Building on the tradition of the original Lightning Bolts which have achieved $30B of cost savings and avoidance
  - The critical element: involvement of our workforce and industry partners to continue and re-energize our reform activities for the ultimate benefit of the warfighter

LB 99-1: Acquisition Support Teams

- **Mission**
  - Expand role of Request for Proposal (RFP) support offices to encompass full range of pre-award activities
    - Risk assessment and management
    - Acquisition strategy development
    - Performance-based solicitation development
    - Source selection
- **Implementation**
  - Rename all AFMC support offices to “Acquisition Support Teams”
  - Provide expert advice on acquisition reform and business practices
  - Implement LB 99-2, Superior Source Selections

LB 99-1: Acquisition Support Teams

- **Schedule**
  - Initial operational capability by Oct 99
- **Benefits**
  - Provide one-stop-shopping for acquisition reform initiatives
  - Develop consistency across AFMC for pre-award activities

LB 99-2: Superior Source Selections

- **Mission**
  - Improve the consistency, quality, documentation, and debriefings on all Air Force source selections
  - Identify expert advisors at each AFMC center and at each operational MAJCOM HQ/LGC
    - Actively participate in or be available to provide assistance on all Air Force source selections
- **Implementation**
  - Develop training materials on innovative approaches
    - Share and adopt best practices, lessons learned, and acquisition reform initiatives
  - In AFMC, advisors mandatory for source selections above $100M
  - For Operational MAJCOMs, advisors mandatory for source selections above $10M

LB 99-2: Superior Source Selections

- **Schedule**
  - AFMC and Operational MAJCOMs implement not later than 1 September 1999
- **Benefits**
  - Provide consistent implementation of “best value” source selections
  - Assist MAJCOMs in proposal development and evaluation
  - Provide real-time support prior to contract award
  - Develop consistent communication with industry
  - Provide clear, thorough, consistent documentation of the evaluation and decision

LB 99-3: Market Analysis and Pricing Centers of Expertise

- **Mission**
  - Expand the use of commercial item solutions and the adoption of commercial practices
  - Support price-based acquisition strategies
  - Integrate the technical, contracting and program management functions in the conduct of market research
- **Implementation**
  - Each Center to create a centralized Center of Expertise (COE) to exploit their existing areas of expertise
    - Responsible for gathering, organizing, analyzing, and maintaining information on market products, practices, technologies
  - Information aligned with the product line structure
  - COE a multi-functional team integrating activities with ASTs
  - Aid in acquisition process

LB 99-3: Market Analysis and Pricing Centers of Expertise

- **Schedule**
  - AFMC Center plan of action by 1 Jun 99
    - May include organizational changes
  - Each Center fully operational by 1 Oct 1999
- **Benefits**
  - Establish critical mass for expertise and resources
  - Reduced cost, improved quality, shorter cycle times, and ultimately, better weapon systems

LB 99-4: Alternative Dispute Resolution

PESYSTEMS, INC.

- **Mission**
  - Ensure that ADR, rather than litigation, is the first choice whenever negotiation of a contract issue reaches an impasse
  - Resolve controversial contract issues at the lowest level and as early as possible using the least expensive means
  - Enhance the long-term partnering of the AF and industry teams by seeking creative, efficient and sensible outcomes to contractual disagreements

- **Implementation**
  - Ensure that all ACAT I and ACAT II programs have operative ADR agreements by 1 Oct 1999

LB 99-4: Alternative Dispute Resolution (ADR)

- **Benefits**
  - Preserves essential long-term business relationships
  - Minimizes costly and time-consuming litigation
- **Status**
  - ADR implementation agreements for all ACAT I and II programs 98% complete
  - 5 year plan to train lawyers and then contracting/acquisition personnel ongoing

See www.safaq.hq.af.mil/contracting for status

LB 99-5: Contracting Support to the Aerospace Expeditionary Forces

- **Mission**
  - Restructure operational contracting squadrons
    - Eliminate the commodities flight
    - Establish acquisition flights and teams
  - Provide for a dedicated contingency contracting cell responsible for oversight, management, training, and readiness of Contingency Contracting Officers (CCOs)
- **Implementation**
  - CCOs will be assigned to a specific AEF
  - Tailor training and activities based upon deployment location customs, procedures, and local contracting office policies

LB 99-5: Contracting Support to the Aerospace Expeditionary Forces

- **All Operational Contracting Squadrons re-organized by 30 Sep 99**
  - Parallels the AEF concept (they know when they will go)
- **Benefits**
  - Ensure well-trained contracting workforce for AEFs
  - Improve ability to execute field contracting
- **Status**
  - Operational

LB 99-6: Improved Payment Processes

PES SYSTEMS, INC.

- **Mission**
  - Provide selected program offices the opportunity to test innovative solutions including
    - Streamlining the structure of accounting data
    - Expanding the use of purchase cards
    - Improving the payment prevalidation process
    - Applying consistent payment instructions
- **Implementation**
  - AFMC will conduct test programs involving the B-1, B-2, GPS, AMRAAM, DMSP, JASSM, JDAM, MILSATCOM, and F-16 program offices and two major service contracts

LB 99-6: Improved Payment Processes

- **Schedule**
  - Test programs will start to test initiatives in mid-May 99
  - Interim results to SAF/AQ, SAF/FM and DFAS by 1 Nov 99
- **Benefits**
  - Faster, more efficient and less complex payment processes
  - Streamlined accounting structures with improved payment accuracy
  - Expanded use of purchase cards including use on major systems
  - Reduced workload for both program offices and DFAS
- **Things are no better today**
  - May have gotten worse

LB 99-7: Product Support Partnerships

- **Mission**
  - Reengineered weapon system product support concepts
  - Pursue public-private partnering to take advantage of the best government or commercial repair sources
- **Implementation**
  - Publish a Product Support Transition Guidebook for use by Program Managers
  - Implement Product Support strategies in pilot programs
  - Ten pilot programs to test the concept of increasing Program Manager oversight of life cycle support
    - F-16, SBIRS, B-1, C-5, F-117, KC-135, AWACS, JSTARS, C-17, Cheyenne Mountain Complex

LB 99-7: Product Support Partnerships

- **Schedule**
  - Publish Product Support Transition Guidebook by 15 Jul 99
  - Disseminate materials to train field level AST teams by 15 Jul 99
  - Product Support implementation plans drafted by 1 Jun 99
    - Approved by 30 Nov 99
- **Benefits**
  - More competitive depot workforce
  - More cost-effective product support for operational MAJCOMs

Conclusion

- **The 1999 Lightning Bolts are an Air Force-wide initiative**
  - Sponsored by SAF/AQ
  - Involving the AF Secretariat, Air Staff, and operational MAJCOMs
- **Another step in cycle of continuous business improvement**
  - Previous initiatives have led to major process improvements
  - The 1999 Lightning Bolts should continue this trend

RIGHT!!!!!!

Systems Management Techniques

PESYSTEMS, INC.

SYSTEMS ANALYSIS AND CONTROL .....IN REVIEW

MATCH THE ISSUE
WITH THE APPROACH

DESIGN/DEVELOPMENT ISSUES

ARE WE DOING THIS RIGHT?
DOES PROJECT STRUCTURE CONTROL RISK?
HOW DO WE MAKE DESIGN CHOICES?
WILL OUR CHOICES MEET PERFORMANCE NEEDS?
SHALL WE DEVELOP OUR CHOSEN APPROACH?
WHAT CAPTURES DESIGN PROGRESS?

MGMT APPROACH/TOOL

TRADE STUDIES

TECHNICAL REVIEWS

CONFIG MGMT

RISK MGMT

TPM

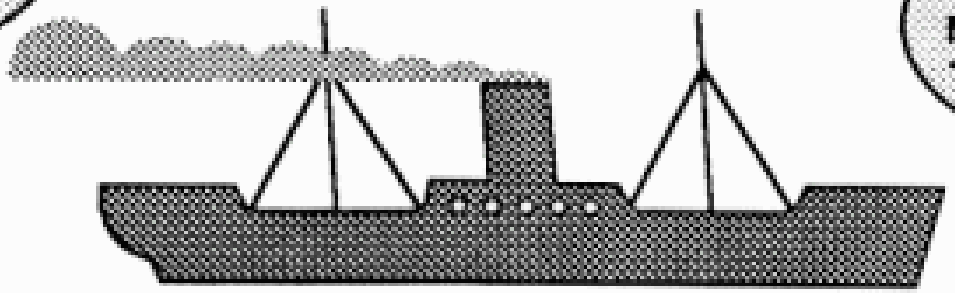
WBS

SYSTEMS ANALYSIS AND CONTROL

CAN WE TRADE-OFF WEIGHT FOR SPEED?

DO THE DRAWINGS MATCH THE PRODUCT?

IF IT'S 2k lbs TOO HEAVY NOW, CAN WE GET TO THE GOAL BY PROD.?

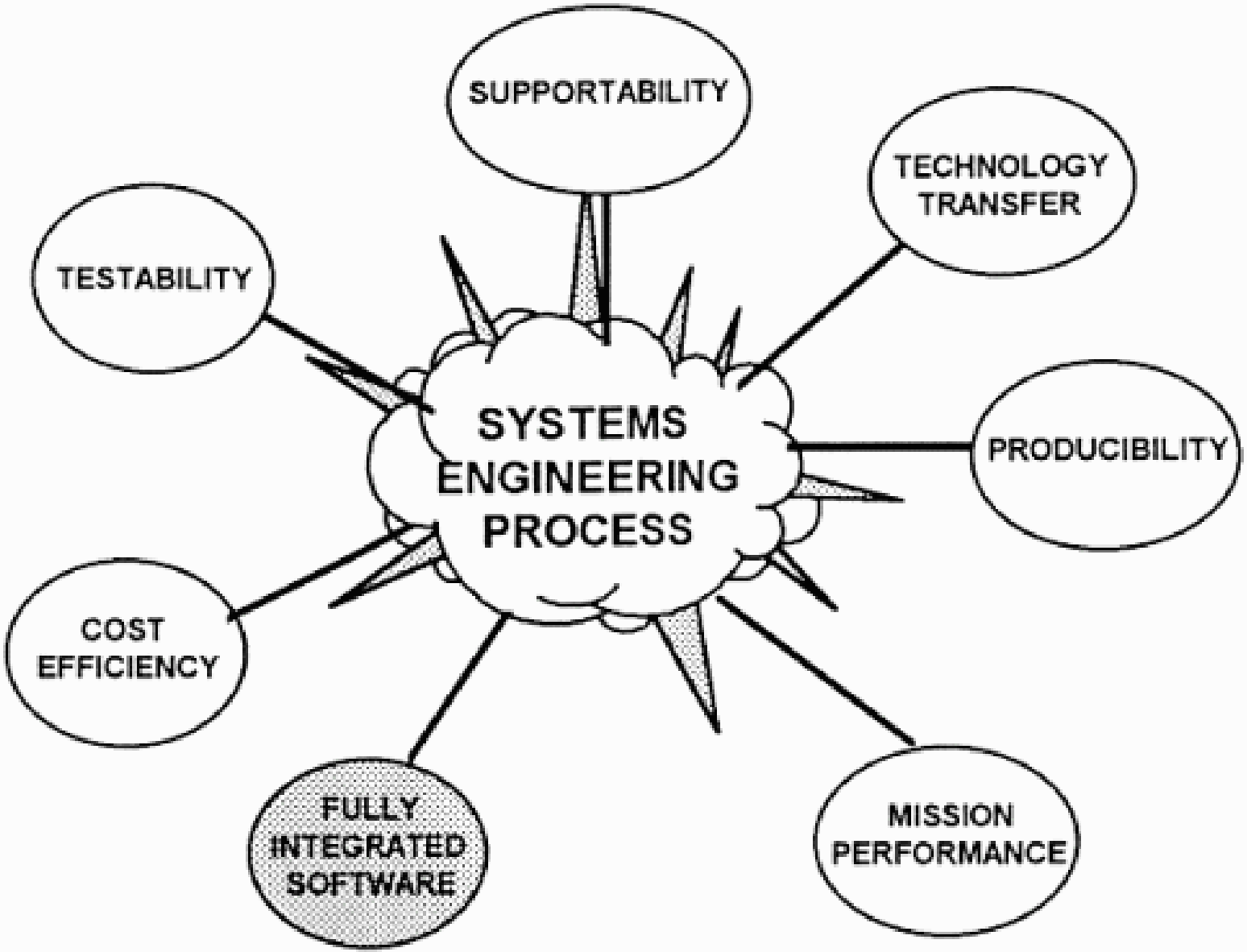


WHAT RISKS REMAIN?

HOW MANY SOFTWARE TROUBLE REPORTS ARE THERE PER MONTH?

CRITICAL DESIGN REVIEW IS IN 2 WEEKS

MAJOR GOALS OF THE SE PROCESS

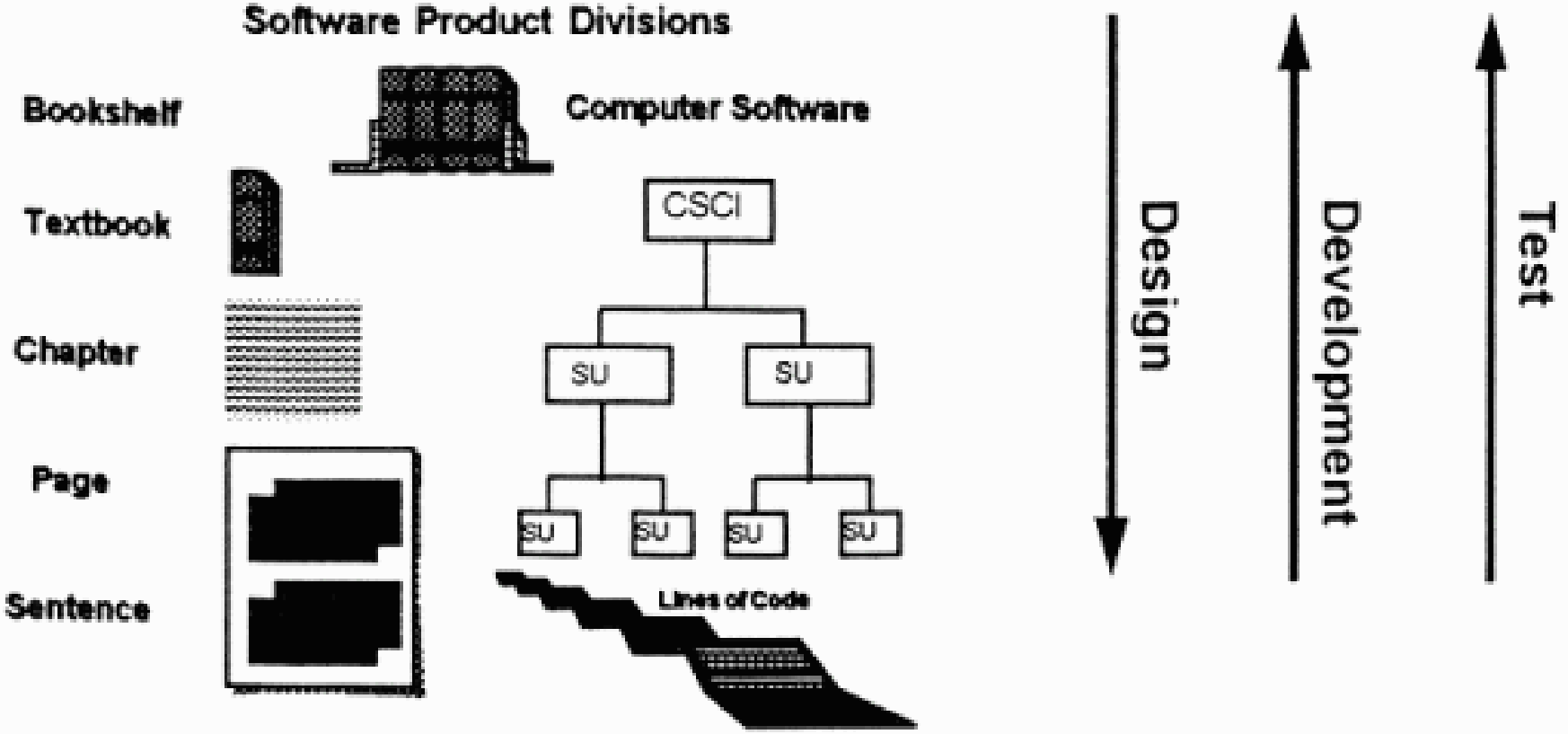


Planning

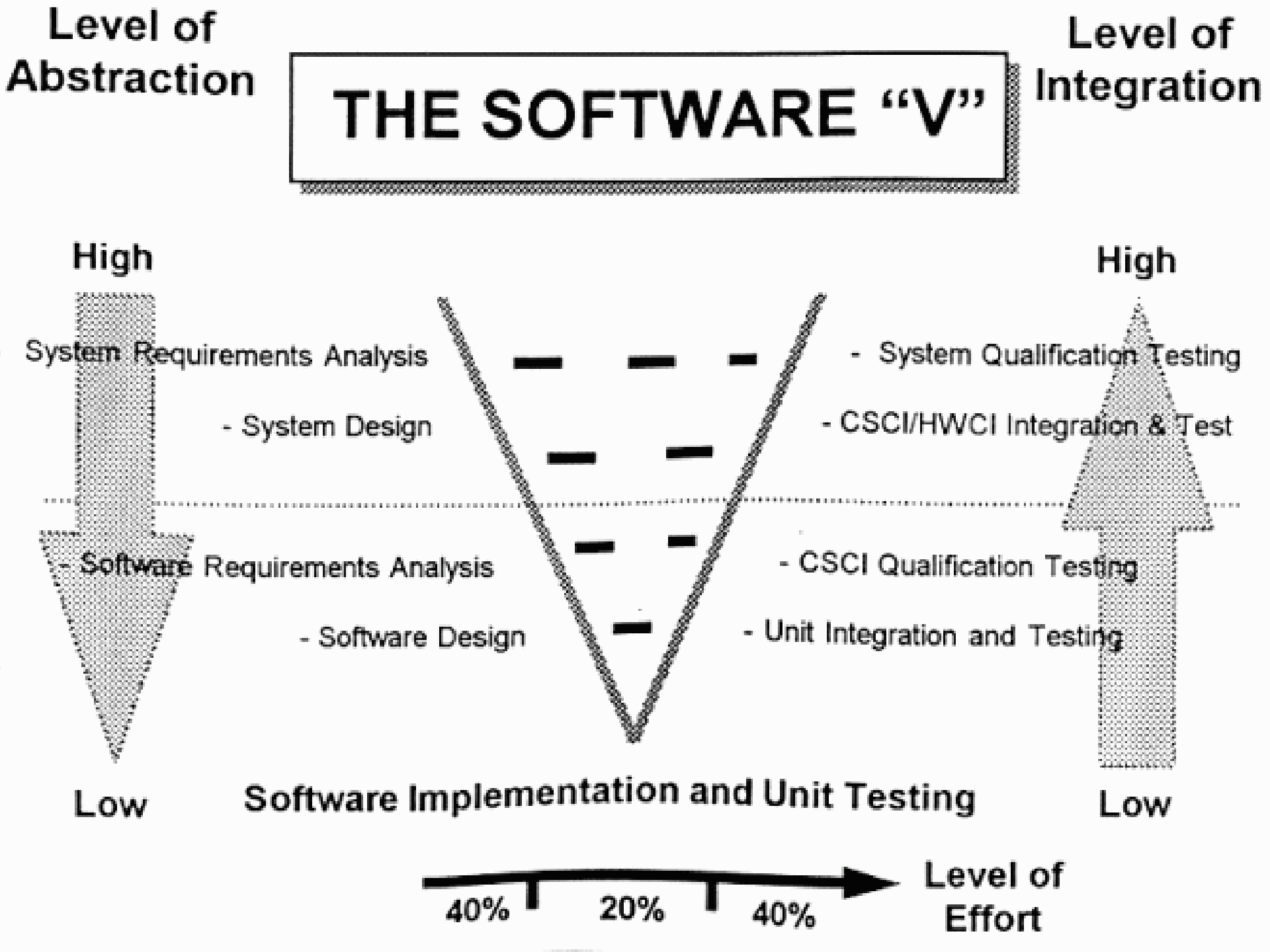
SOFTWARE MANAGEMENT PLANNING

- IDENTIFY MAJOR RISK AREAS AND METHODS TO CONTROL THEM
- DEVELOP ACQUISITION, DEVELOPMENT, AND POST DEPLOYMENT SOFTWARE SUPPORT STRATEGIES
- ESTABLISH METRICS AND MEASURES TO ASSESS PROGRAM PROGRESS

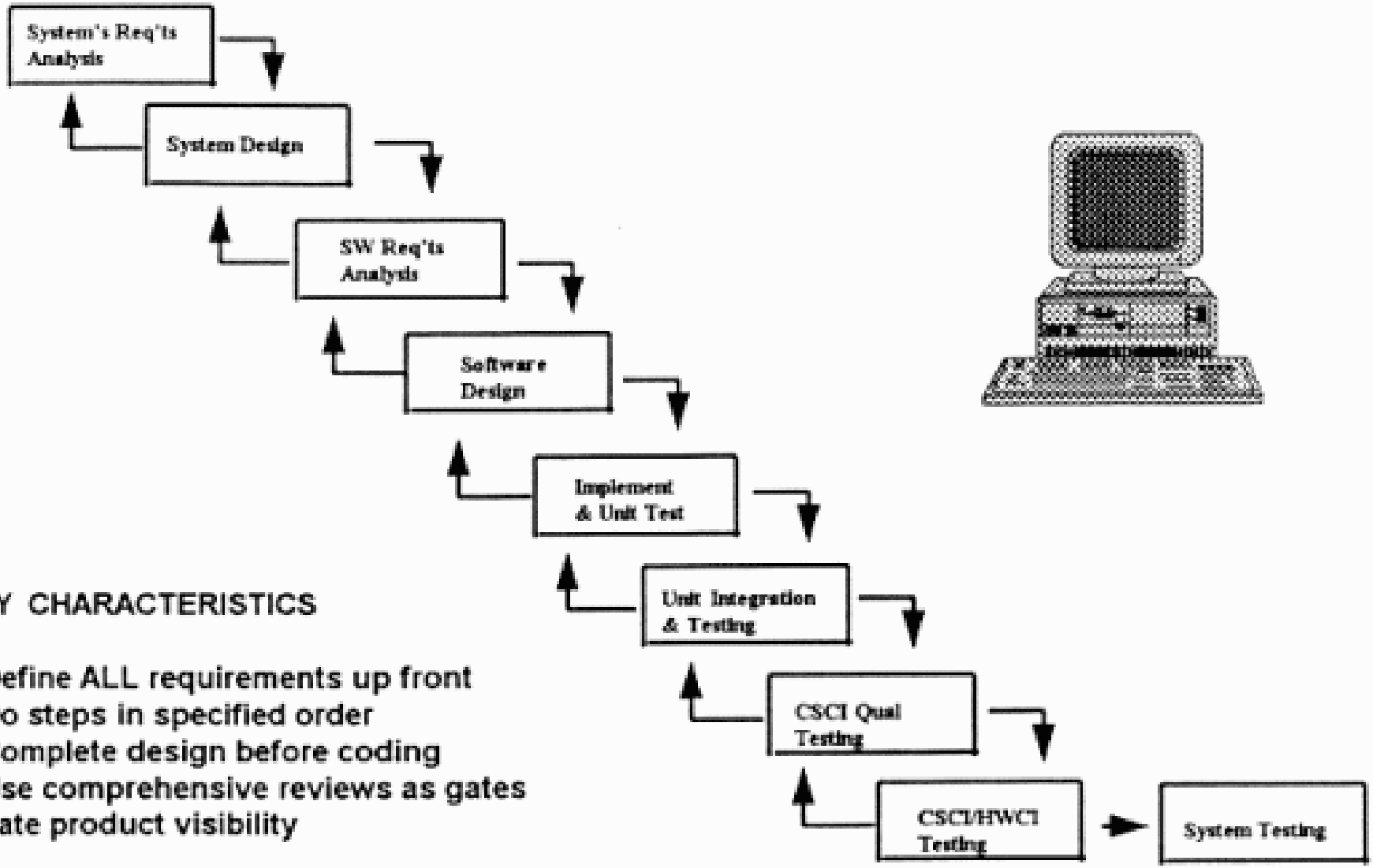
Software Management
Design / Design Management



What initializes the design? _____


Level of Abstraction
THE SOFTWARE "V"
Level of Integration
High
High
System Requirements Analysis
- System Design
- System Qualification Testing
- CSCI/HWCI Integration & Test
Software Requirements Analysis
- Software Design
- CSCI Qualification Testing
- Unit Integration and Testing
Low
Software Implementation and Unit Testing
Low
40%
20%
40%
Level of Effort

"WATERFALL"
Development Paradigm



KEY CHARACTERISTICS

- Define ALL requirements up front
- Do steps in specified order
- Complete design before coding
- Use comprehensive reviews as gates
- Late product visibility

Program Pitfalls

- **Requirements Creep**
- **Changes in cost, schedule or performance**
  - any change will impact at least 2 of the above
    - engineers are never finished
- **Beware the call from the staffer**
  - "What if" we cut your budget
    - the answer is it will cost 30% more for each year delay

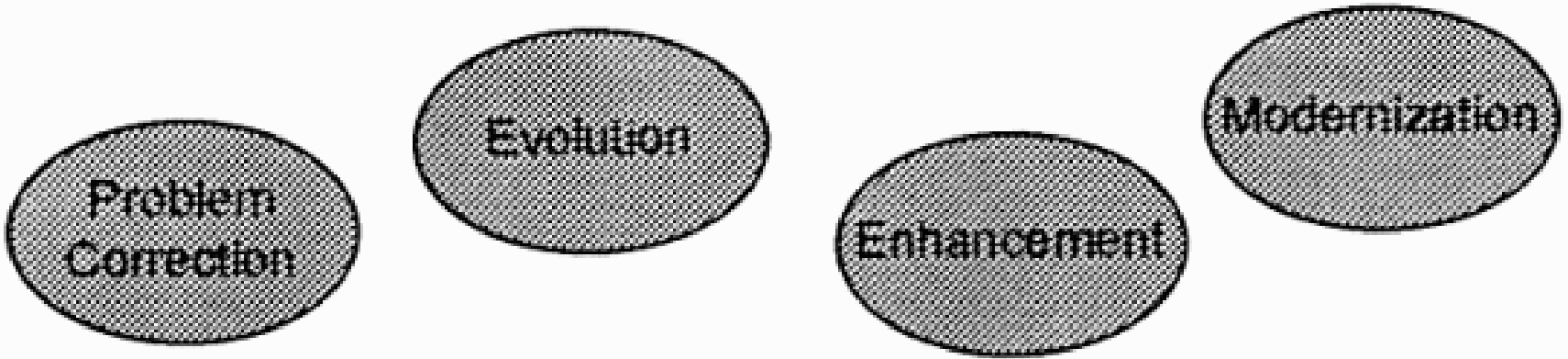
A REQUIREMENTS

CREEP!!

Post Deployment Software Support - PDSS

Activities to ensure that fielded software continues to fully support the operational mission of the system

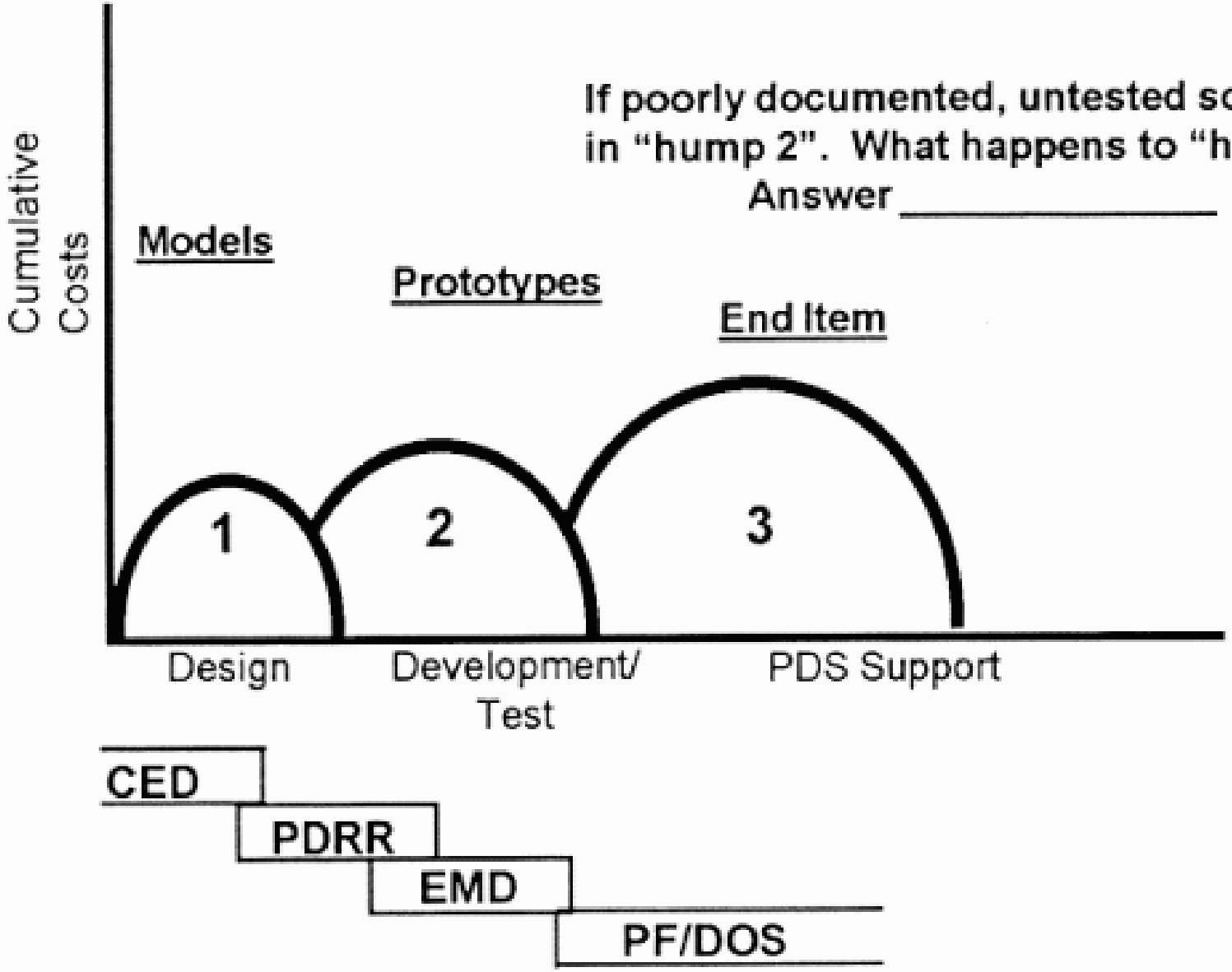
- **Correct problems**
- **Provide new functions**



Post Deployment Software Support - PDSS

If poorly documented, untested software is used in "hump 2". What happens to "hump 3"?

Answer _____



Test and Evaluation

- **Test: a program, procedure or process to obtain, verify or provide data for determining the degree to with a system meets, exceeds or fails to meet stated requirements**
- **Evaluation: The review, analysis and assessment of data obtained from testing, used to project system performance**

…is the conscience of acquisition (William Perry, SECDEF)

Why Test

- **Purpose: Reduce Risk**
- **Product: Information to Decision Makers**
- **Types of test**
  - Development Test and Evaluation
  - Operational Test and Evaluation

Development Test and Evaluation

- **Measure Technical performance**
  - Thresholds and Objectives
  - Contract Compliance
- **Assist in system development**
  - Integral to Systems Engineering Process
  - Risk Assessment
- **Update models and simulations**

DT&E Examples

PESYSTEMS, INC.

Performance Testing

- Accuracy
- Maneuverability
- interoperability
- reliability
- maintainability
- software unit testing
- S/W integration
- Software functionality

Environmental Testing

- Temperature
- Pressure
- Vibration
- Shock
- Humidity
- Salt sea spray
- rain, snow, ice
- Lightning

Contractor Test Program

- Described in SOW,WBS, system specification
- Detailed approach found in technical specifications
- Technical performance verification: cooperative effort of T&E and systems engineering

Contractor Role in Testing

- Deliver integrated test plan for approval
- Test sufficiently before delivery to government
- Provide technical support to government testing
- Correct problems
- Help minimize testing redundancy

**In commercial acquisitions, government may perfo*

Production Acceptance T&E

- **Verify each production unit meets contract requirements**
  - Usually performed at contractor's facility
  - DCMC may provide management oversight
  - May involve developer and user

Operational Test and Evaluation

- **Purpose: to determine operational effectiveness and suitability**
  - in a realistic combat environment
  - With threat representative forces
  - While operated and maintained by typical users
  - Using production representative systems
- **Determine if the minimum operational performance requirements, as specified in the ORD, have been satisfied**

OT&E Focus

- **Operational Effectiveness**
  - Does it work to accomplish mission in the predicted environment, considering tactics, personnel, doctrine, threat, etc.
- **Operational Suitability**
  - Can it be fielded and supported
    - …ilities satisfied?
    - Training and supplies in place?

Test Pitfalls/Issues

- **If test not objective, how do you know if contractor met his requirements vs. contract requirements incorrectly stated**
  - This issue one of reasons for performance based requirements
  - Make sure test plan complete before test
- **Test community wants you to fund their new golf course**

T&E Summary

- **Essential Feedback loop to design process**
- **Developmental T&E (DT&E)**
  - assist in system development and measure technical performance
  - Government and contractor conduct
  - Government PM responsible
- **Operational T&E (OT&E)**
  - determines operational effectiveness and suitability
  - Government only conducts
  - independent operational test agency responsible

Program Technical Reviews

Technical Reviews

Used at Program Manager's Option

- Purposes include:
- Assess design progress/review Systems Engineering (SE) outputs
- Ensure SE outputs meet user needs.
- Reviewing trade studies.
- Determine contractor readiness to proceed.
- Assess design maturity

Insist on technical reviews - it protects everyone involved.

Technical Reviews… guiding principles

Technical Reviews

A few guiding principles.....

Ensure:

- Objectives for the review are well-communicated.
- Attendance of necessary participants.
- An event driven, vs. schedule-driven, perspective.
- Necessary data will be available for review (design specifications, drawings, test data, software development folders, etc.)
- Action items are assigned, tracked, and closed in a timely manner.

Technical Performance Measurement

TECHNICAL PERFORMANCE MEASUREMENT (TPM)

Purpose: Monitor performance risk by comparing actual vs. expected results.

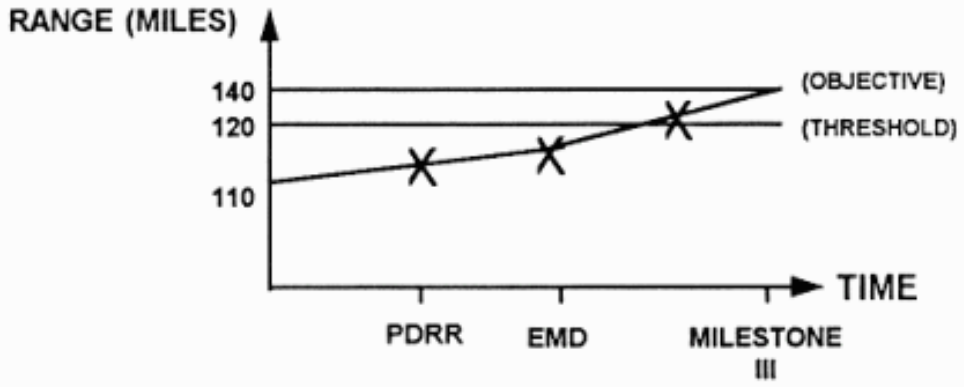
- Focus is on key performance parameters.
  - Designated by program manager.
  - Documented by contractor.
- Traceable to WBS.
- This is our technical report card!

The better you "know" where risks reside, the better you can manage them.

TPM

TPM.....AN EXAMPLE.

TYPICAL TPM PARAMETERS: WEIGHT, COMPUTER MEMORY SIZE, COOLING CAPACITY, REACTION TIME/RESPONSIVENESS, RANGE, PROCESSING TIME.....THINGS THAT CAN BE DIRECTLY MEASURED AND ARE SIGNIFICANT DETERMINANTS OF THE TOTAL SYSTEM/PRODUCT.



Metrics

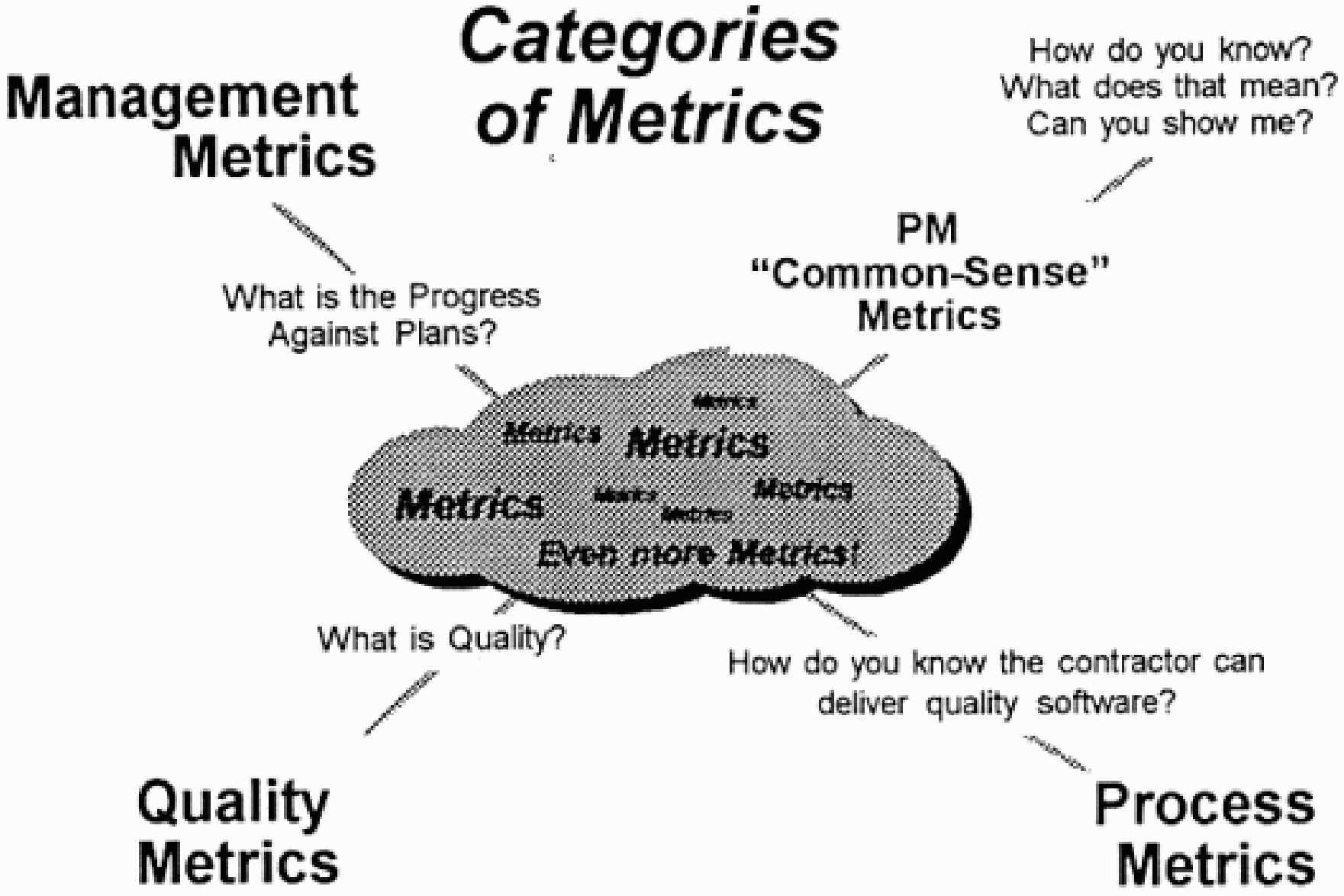
- **Metrics are those things you measure which cause you to take the appropriate action to achieve a desired goal**
  - Apply to hardware, software, cost and schedule
- **Metrics must:**
  - Communicate the health of the process/program
  - Have a time dimension
  - Have customer orientation

Characteristics of Metrics

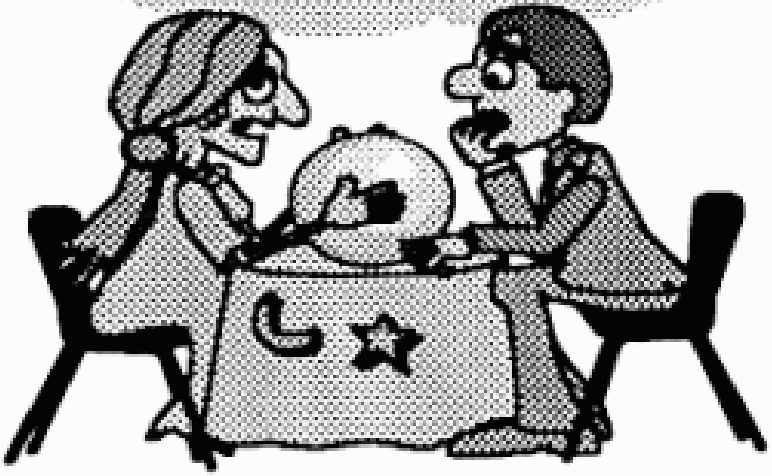
- **Good Metrics**
  - are unambiguous and economical to collect
  - simple, logical, repeatable, easy to understand
  - timely and drive you to the appropriate action
- **Bad Metrics**
  - “count the ants”
  - require armies of people
  - paralyze the decision makers

Good metrics must be meaningful to the customer.

Categories of Metrics



Software Metrics



"If you ain't measurin, you ain't managin... you're only along for the ride (downhill)!"

[CAMPBELL95]

"You can't manage what you can't measure."

[DEMARCO86]

METRICS:

- **MONITOR** requirements
- **PREDICT** development resources
- **TRACK** development progress
- **UNDERSTANDING** maintenance costs

Course Summary

- **DoD Acquisition is very complex, very hard to learn, and full of pitfalls**
  - But it has produced the best weapons in the world
- **Acquisition Corps is saddled with changing and conflicting rules**
  - Downsizing and upcoming retirements don't help
- **AFRC will participate more and more over time**
  - Must know the fundamentals

PESystems here to help!

Overview

- **Acquisition Environment and Process Overview**
- **Marketers, Business Development, and the Action Officer**
- **Requirements Generation Process**
- **Contracting**
- **Financial Management:**
  - Cost Estimation
  - PPBS/Resource allocation
  - Program/Budget Execution
- **Program Execution**
- **Production & Deployment**
- **System Upgrades/ Modifications**

The Future

- **Based on your feedback, we will**
  - Provide periodic updates
  - Flesh out areas of interest

- **In the meantime,**
  - Call 937-258-0141, or
  - e-mail muecker@bdidayton.com